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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:	)	PATENT
	)	
Hassan P. A. Salam	)	Group: 2879
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Serial No: 10/051,187	)	Examiner: Sikha Roy
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Filed: January 22, 2002	)	
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HIGH POWER LED LAMP

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INFORMATION DISCLOSURE STATEMENT

Washington, D.C.
August 26, 2002

Honorable Director for Patents
Washington, D.C. 20231

Sir:

The inventor wishes the accompanying documents to be considered by the examiner in the evaluation of the patentability of this present invention.

It should be noted that the claims of the parent application are directed to lamps using LED structures grown on a non-semiconductor substrate. The claims of the present application are not confined to LED structures grown on a non-semiconductor substrate.

U.S. Patent No. 4,225,380 describes an LED display that uses a semiconductor substrate 22 of silicon. Each display pixel has a light generating junction between a p-type portion 32 and an n-layer 24. P-type diffusions provide isolation regions 28 to isolate the pixels from each other at the n-layer. Light collimating features 40 are provided in a silicon dioxide layer forming a Fresnel lens 38. Half the light generated is

lost downwards in substrate 22, since silicon is absorbent to visible light. There is no suggestion of how to solve the problem of avoiding cluster lamps or of exploiting guided light to improve light output from an LED.

U.S. Patent No. 3,900,863 has the objective of increasing the efficiency of light extraction of an LED structure. It illustrates LEDs grown on a n-type GaAs substrate 10 through a mask 14, each having an active region 22a parts of which slant. Downward visible light from active region 22a is lost, and this loss greatly reduces the light-extraction efficiency of the structure. Both the GaAs substrate 10 and the gold-germanium n-contact at 26 are absorbent to visible light. Because of the loss of the downward light (corresponding to a drop of lamp efficiency of about 50%) the U.S. Patent No. 3,900,863 arrangement would not be satisfactory for carrying out the function of a cluster lamp. There is no suggestion of exploiting guided light to improve light output from an LED.

GB 2311413A has a semiconductor substrate 3 and relies on shaping the top of an LED with repetitive features, referred to as "ordered texturing," to enhance light output. The top part of the LED, above the active layer 2, is wavy in cross-section. The wave shape may be square, triangular or sinusoidal. Figs. 13, 14 illustrate light escape from the top of the LED. For these drawings, the textured featuring allows rays emanating from the active region and included 45 degrees to the active region to pass out through the top of the LED. Figs. 13, 14 show that an emission profile inclined at 45 degrees is engineered by design of the respective associated multiple-layer DBR (Bragg reflector) structures 20A, 20B, 22. A wavy top optimized for passing rays emanating at 45 degrees

to the plane of the active region can be obstructive to rays emanating at 90 degrees to the plane of the active region.

There is no suggestion in GB 2311413A of how to solve the problem of avoiding cluster lamps (such as the cluster lamp of U.S. Patent No. 6,045,240, cited by the examiner in the parent application) or of exploiting guided light to improve light output from an LED.

EP 0559455A describes LED arrangements (Figs. 4B 6B, 8-9) having a GaAs substrate and teaches avoiding loss of LED light due to the top contacts 37 of the LED. Contacts 37 absorb light and for this reason generation of light under top contacts 37 is suppressed.

Light is generated only in those parts of the active region 33 through which current, represented in the drawings by the dotted lines, passes. The arrangement of Figs. 8, 9 is a 20ma device but has multiple top conductors 37 and uses Bragg reflectors 41. Lateral light accounts for 66% of the light generated in a n LED chip, but there is no discussion in EP 0559455A of releasing such light before it reaches the chip sides. Since Bragg reflectors are costly to provide, since light is only generated where the current is shown dotted, and since there is no release of lateral light other than the chip sides, the arrangement of Figs. 8, 9 is not satisfactory for replacing a cluster lamp. There is no suggestion of exploiting guided light to improve light output from an LED.

EP 0442002A1 describes another LED having a GaAs substrate 1. The LED has a top with a wavy cross-section for light extraction. The arrangements rely on creating "surface plasma ions" to produce strongly directed radiation patterns, illustrated in Fig. 12. Such sharp light

distribution patterns are not suitable for displays, traffic lights or general lighting. There is no indication of how to solve the problem of avoiding cluster lamps or of exploiting guided light to improve light output from an LED.

Respectfully submitted,

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